

COVID-19 Seroprevalence Brief Report

Report #31A: February 1 - February 14, 2023, Survey

(Reported March 8, 2023)

Introduction

In partnership with the COVID-19 Immunity Task Force, Canadian Blood Services is testing residual blood for SARS-CoV-2 antibodies from blood donors. This report tracks SARS-CoV-2 seroprevalence distinguishing natural and likely vaccine induced humoral immunity. We present seroprevalence rates based on two Roche total Ig- assays that detect Spike (S) and Nucleocapsid (N) antibodies and monitor the concentration of S antibodies. We report weekly seroprevalence and evaluate differences by geographical regions, age groups, racialized groups, and socioeconomic status.

This is a brief bi-weekly report intended to provide updates to inform public health policy and mathematical modelling as the Omicron variant wave progresses. Full reports with more detailed results are released monthly.

Methods

POPULATION

Canadian Blood Services has blood collection sites in all large cities and many smaller urban centres in all provinces except Quebec. People in rural areas may have less opportunity to donate and donations are not collected in the northern territories. Blood donors are reasonably representative of healthy Canadians between the ages of 17 and about 60.

SARS-COV-2 ANTIBODY TESTING

Two assays were used. The Roche Elecsys® Anti-SARS-CoV-2 spike semi-quantitative immunoassay detects total antibodies (including IgA, IgM and IgG) to the SARS-CoV-2 spike (S) protein (**Spike antibody**). The Elecsys® Anti-SARS-CoV-2 qualitative immunoassay detects total antibodies (including IgA, IgM and IgG) to SARS-CoV-2 using a recombinant protein, nucleocapsid (N) antigen (**Nucleocapsid antibody**). At a concentration of ≥ 0.8 U/mL, the Spike antibody assay was assumed to have sensitivity of 98.8% and specificity of 99.6%. At a concentration of ≥ 1.0 U/mL, the Nucleocapsid antibody assay was assumed to have sensitivity of 99.5% and specificity of 99.8%. All testing was conducted at Canadian Blood Services laboratories in Ottawa.

Full details on methods, data management and analysis, and ethical issues can be found in the previous Report, #30: January 2023.

Results

Between February 1 and February 14, 2023, a total of 15,445 unique donors were tested for SARS-CoV-2 antibodies.

Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. The (adjusted) proportion of blood donors with humoral immunity was 100% (95% CI, 100.00, 100.00) (based on results from the Spike antibody assay). A peak in blood concentration followed by decline is expected after vaccination. Spike antibody concentrations are shown since September 2021 (Figure 1) and declines and peaks in antibody concentration are consistent with the roll-out of third and fourth vaccination doses in late 2021/early 2022, in the spring of 2022 and in the fall of 2022. Peaks occurred earlier in older age groups, consistent with the policies to vaccinate older age groups earlier and progressively in younger donors. Anti-Spike concentrations increased since the summer of 2022, however since January they have started to decline, particularly in older age groups.

The nucleocapsid seroprevalence is indicative of natural infection (Table 1). There was no change over the 14-day reporting period from 78.52% (95% CI, 77.57, 79.46) in the last week of January, to 78.34% (95% CI, 77.41, 79.26) in the first week of February and 77.31% (95% CI, 76.36, 78.27) in the second week of February. Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate compared to other age groups at 86.79% (95% CI 84.63, 88.95) in the week of February 8-14. Racialized groups continue to have higher seroprevalence compared with white donors (83.26% (95% CI, 81.29, 85.24) vs 75.69% (95% CI, 74.59, 76.79) in the week of February 8-14.

Conclusion

Spike antibody concentrations remain high. This may be related to a combination of vaccination and breakthrough natural infections. Despite all donors having vaccine related antibodies, the infection related antibody rate is 77.31% (95% CI, 76.36, 78.27) by mid-February, consistent with the continued prevalence of the Omicron subvariants.

Table 1. Weekly SARS-CoV-2 seroprevalence by sociodemographic variables by natural infection (nucleocapsid) results in January and February 2023 (weighted for population demographics and adjusted for test characteristics (sensitivity and specificity)).

	January 24-31				February 1 – 7				February 8 – 14			
	Crude		Adjusted		Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% CI	Number Tested	Number Positive	Percent Positive	95% CI	Number Tested	Number Positive	Percent Positive	95% CI
Sex												
Female	3,086	2,415	79.35	78.03, 80.67	3,174	2,478	77.74	76.44, 79.04	3,018	2,330	77.19	75.85, 78.52
Male	4,411	3,363	77.70	76.36, 79.05	4,789	3,697	78.97	77.66, 80.27	4,464	3,384	77.44	76.07, 78.81
Age												
17-24	635	549	85.90	83.88, 87.91	538	486	91.33	89.46, 93.19	563	486	86.79	84.63, 88.95
25-39	2,017	1,669	83.18	81.47, 84.88	2,098	1,756	84.06	82.41, 85.71	1,910	1,589	83.73	82.02, 85.44
40-59	2,665	2,111	79.62	78.01, 81.23	2,992	2,404	80.75	79.27, 82.24	2,769	2,166	78.45	76.85, 80.05
60+	2,180	1,449	67.92	65.81, 70.02	2,335	1,529	64.68	62.67, 66.70	2,240	1,473	65.93	63.90, 67.97
Province												
British Columbia	1,498	1,107	75.64	73.32, 77.96	1,663	1,238	75.25	73.13, 77.37	1,214	906	75.85	73.42, 78.29
Alberta	1,739	1,413	83.46	81.33, 85.60	1,595	1,275	81.83	79.60, 84.05	1,518	1,226	82.03	79.78, 84.28
Saskatchewan	370	287	80.20	75.82, 84.58	356	276	79.81	75.59, 84.03	305	219	73.58	68.27, 78.89
Manitoba	349	276	79.79	75.32, 84.25	382	319	82.50	78.64, 86.37	352	288	81.65	77.51, 85.78
Ontario	2,862	2,191	77.95	76.57, 79.34	3,405	2,637	78.19	76.86, 79.52	3,258	2,437	76.05	74.67, 77.44
New Brunswick	153	120	81.55	75.35, 87.74	258	196	77.25	71.03, 83.47	377	294	80.30	75.42, 85.18
Nova Scotia	307	208	68.92	63.61, 74.24	261	199	74.62	68.91, 80.32	307	226	73.68	68.35, 79.02
Prince Edward Island	52	41	78.15	67.32, 88.97	17	12	72.99	58.60, 87.39	23	17	83.73	72.89, 94.56
Newfoundland	167	135	83.59	79.07, 88.11	26	23	89.42	80.64, 98.20	128	101	79.01	73.99, 84.03
Metro area												
Vancouver	691	537	77.85	74.79, 80.90	780	596	76.79	73.76, 79.83	684	530	78.54	75.40, 81.68
Calgary	748	596	81.33	77.63, 85.03	604	484	81.92	78.19, 85.65	506	412	82.39	78.35, 86.43

Edmonton	529	436	84.19	80.67, 87.70	535	421	80.35	76.48, 84.21	455	369	82.12	78.05, 86.19
Ottawa	298	211	69.52	63.27, 75.77	238	176	75.52	70.01, 81.02	272	194	72.81	67.57, 78.05
Toronto	860	677	79.30	77.25, 81.35	1080	855	79.10	77.05, 81.15	994	777	78.47	76.36, 80.58
Winnipeg	194	149	77.76	71.50, 84.03	252	200	78.09	72.88, 83.30	224	176	78.76	73.32, 84.19
Ethnicity¹												
White	6,006	4,553	77.32	76.23, 78.41	6,301	4,805	76.99	75.92, 78.05	6,031	4,519	75.69	74.59, 76.79
Indigenous	118	90	74.92	66.92, 82.93	124	98	80.65	73.19, 88.10	108	83	78.02	70.10, 85.95
Asian	705	581	83.11	80.50, 85.73	796	660	82.99	80.44, 85.55	642	520	81.93	79.04, 84.83
Other racialized groups	529	441	84.04	80.98, 87.10	586	488	83.47	80.48, 86.47	560	472	85.70	82.88, 88.52
Social Deprivation²												
1 (least deprived)	1,373	1,072	79.99	77.85, 82.13	1,625	1,253	77.56	75.51, 79.62	1,356	1,058	79.45	77.26, 81.64
2	1,399	1,112	80.22	78.09, 82.35	1,481	1,160	78.91	76.81, 81.01	1,331	1,018	77.51	75.24, 79.77
3	1,317	962	74.36	71.96, 76.76	1,344	1,023	77.98	75.70, 80.25	1,299	989	76.35	74.02, 78.69
4	1,219	913	76.66	74.31, 79.02	1,267	984	78.18	75.84, 80.53	1,306	974	75.88	73.55, 78.21
5 (most deprived)	1,258	969	78.48	76.18, 80.79	1,276	984	77.67	75.36, 79.99	1,263	957	76.28	73.96, 78.59
Material Deprivation²												
1 (least deprived)	2,086	1,594	78.15	76.32, 79.98	1,982	1,517	76.80	74.88, 78.71	1,865	1,421	76.37	74.46, 78.29
2	1,669	1,294	78.9	76.90, 80.91	1,764	1,367	78.77	76.81, 80.74	1,594	1,202	77.11	75.00, 79.21
3	1,323	980	74.41	72.07, 76.76	1,487	1,159	78.35	76.20, 80.50	1,364	1,034	76.86	74.58, 79.14
4	975	756	79.59	77.05, 82.14	1,069	817	77.33	74.81, 79.84	1,091	839	77.66	75.17, 80.15
5 (most deprived)	513	404	80.56	77.31, 83.82	691	544	80.16	77.29, 83.04	641	500	78.74	75.62, 81.87
Total	7,497	5,778	78.52	77.57, 79.46	7,963	6,175	78.34	77.41, 79.26	7,482	5,714	77.31	76.36, 78.27

¹ In Week 1, self reported ethnicity was missing for 139 (1.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 81.93% (95% CI 75.67, 88.19). In Week 2, self reported ethnicity was missing for 156 (2.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 84.30% (95% CI 78.44, 90.17). In Week 3, self reported ethnicity was missing for 141 (1.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 86.42% (95% CI 80.62, 92.22).

² In Week 1, postal codes were missing for 931 (12.4%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 82.26% (95% CI 79.74, 84.77). In Week 2, postal codes were missing for 970 (12.2%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 80.38% (95% CI 77.80, 82.96). In Week 3, postal codes were missing for 927 (12.4%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 78.82% (95% CI 76.15, 81.50).

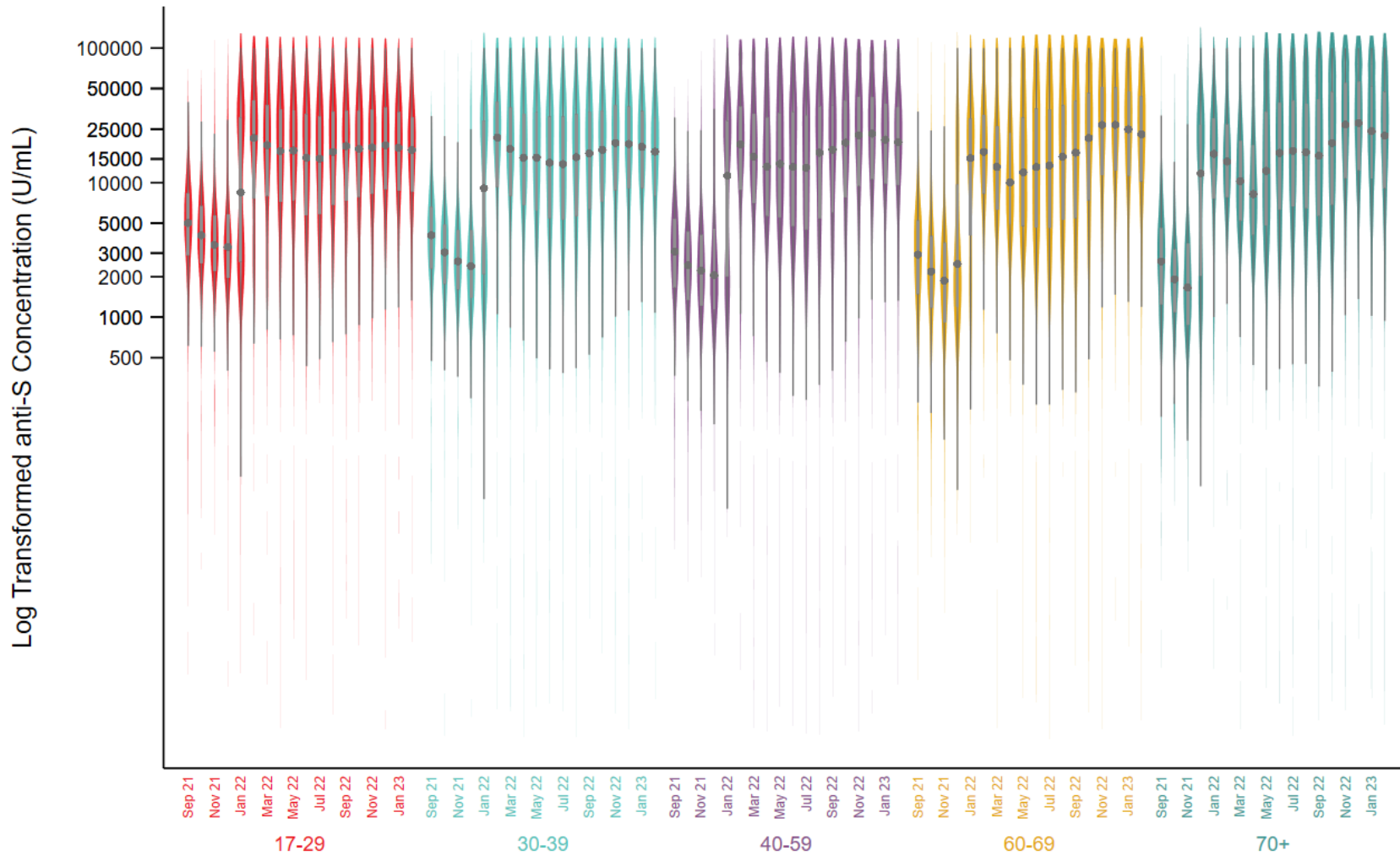


Figure 1. Spike antibody concentration (U/mL) by month and age group from September 1, 2021, to February 14, 2023.